TSKS15, Fall 2017 **E. G. Larsson** **updated September 13, 2017** **green=final**

	Topic		Reading, Kay-I	Reading, Kay-II	Problems, Kay-I	Problems, Kay-II	Problems, EGL
Le 1	Introduction to signal detection. Problems in radar and communications. Classical versus Bayesian approach. Neyman-Pearson theorem. Error probability and Bayes risk.			Ch. 1, Ch. 3		1.2, 3.4, 3.6, 3.14	(1, 2), 5
Le 2	Detection of deterministic signals. Linear models with Gaussian noise. Decision regions. Noise pre-whitening.			Ch. 4		4.6, 4.8, 4.15, 4.16, 4.19	
Le 3	Detection of random signals. Energy detectors. Gaussian models.			Sec. 5.1-5.4, 5.6-5.7		5.2, 5.3, 5.10, 5.14, 5.18	
Le 4	Introduction to estimation. Bias, variance, MSE. Classical versus Bayesian approach. Cramer-Rao bound.		Ch. 1-2, Sec. 3.1-3.5		1.1, 1.4, 1.5, 2.9, 3.1, 3.7		
Le 5	Cramer-Rao bound, cont. Slepian-Bangs formula. Nuisance parameters.		Sec. 3.6-3.9, 3.11		3.9, 3.15, 3.19		6
Le 6	MVU and BLUE for linear models.		Ch. 4, Ch. 6		4.6, 4.11, 6.1, 6.3, 6.15, 6.16, 6.12		
Le 7	Maximum-likelihood estimation. Asymptotic efficiency. Parameter transformations.		Sec. 7.1-7.8, 7.10		7.1, 7.3, 7.9, 7.10, 7.20		7
Le 8	Ad hoc estimators. Linear and nonlinear least-squares. Method of moments. Approximate performance analysis.		Sec. 8.1-8.4, 8.9, 9.1-9.5		8.1, 8.3, 8.5, 8.7, 9.1, 9.7		
Le 9	Bayesian estimators. MMSE and LMMSE. Nuisance parameters.		Sec. 10.1-10.7, Ch. 11, Sec. 12.1-12.3, 12.5		10.1, 10.6, 10.9, 10.11, 11.3, 11.9, 11.16, 11.17, 12.2		
Le 10	Composite hypothesis testing. Classical approach and GLRT. Linear models. Clairvoyant detector.			Sec. 6.1-6.4, 7.1-7.3, 7.4.1, 7.5-7.8, 8.1-8.3, 8.6			
Le 11	Composite hypothesis testing, cont. Bayesian approach to marginalization of nuisance parameters. Model selection.			Sec. 9.1-9.4, 7.4.2, 6.8			
Le 12	Complex-valued data. Circularly symmetric noise. Backup time + Q/A.		TBD				8
Tut 2	Monte-Carlo simulation	handouts	Sec. 7A	Sec. 2.5, Sec. 2A, Sec. 2E			